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SUBSTITUTED GLUCOSAMINE DERIVATIVE AND LASTING FRAGRANCE COMPOSITION

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[There are no amendments to this patent.]

Abstract

Objective

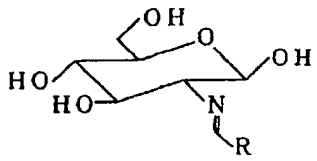
The present invention provides glucosamine derivatives substituted with a fragrance compound of the following formula (1) not described in the literature, and also provides a

long-lasting fragrance composition containing the derivative as an active ingredient.

Means to solve the problem

A long-lasting fragrance composition containing a glucosamine derivative substituted with a fragrance compound of the following formula (1):

[Structure I]



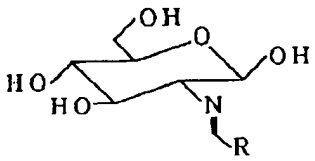
(1)

(in the formula, R represents an aliphatic aldehyde residue, an aromatic aldehyde residue, or an alicyclic aldehyde residue) is mixed with consumable products including foods and beverages, perfumes and cosmetics, and health, sanitary and medical products, to impact an aldehyde-like long-lasting fragrance or flavor to the consumable products.

Claims

1. Substituted glucosamine derivative of the following formula (1):

[Structure 1]

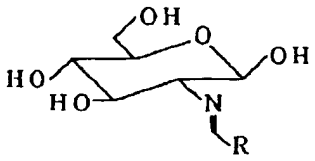


(1)

(in the formula, R represents an aliphatic aldehyde residue, an aromatic aldehyde residue, or an alicyclic aldehyde residue).

2. A long-lasting fragrance composition characterized by containing as an active ingredient a substituted glucosamine derivative of the following formula (1):

[Structure 2]



(1)

(in the formula, R represents an aliphatic aldehyde residue, an aromatic aldehyde residue, or an alicyclic aldehyde residue).

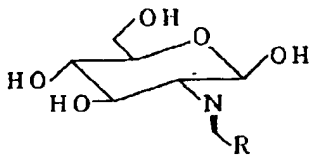
Detailed explanation of the invention

[0001]

Technical field of the invention

The present invention is concerned with glucosamine derivatives substituted with a fragrance compound of the following formula (1) not described in the literature:

[Structure 3]



(1)

(in the formula, R represents an aliphatic aldehyde residue, an aromatic aldehyde residue, or an alicyclic aldehyde residue), and with a long-lasting fragrance composition containing the derivative of the formula (1) as an active ingredient.

[0002]

Prior art

In the case of a precursor of a fragrance compound such as a glycoside fragrance, because the glycoside bonds of the glycoside are gradually cut allowing the fragrance compound to evaporate,

the long-lasting fragrance of the derivative or flavor of the compound gathered much attention, and a number of patent applications were submitted for inventions. Research on glycoside fragrance, a precursor of a fragrance compound, was undertaken by the inventors, and an application for a patent was submitted. Patent applications were submitted for fragrance-reinforcing agents made from plants characterized by containing glycoside fragrance as an active ingredient (Japanese Kokai Patent Application Hei 6[1994]-336401) and aromatic composition gradually releasing fragrance, containing fragrance glycoside as an active ingredient, and used for humans (Japanese Patent Application No. Hei 5[1993]-307309). The purposes of the prior [patent] applications were to provide a long-lasting fragrance composition whose fragrance or flavor lasted for a long time and which gradually released the fragrance compound when the glycoside bonds of the glycoside are cut due to the contact enzymes present in the plant body, bacteria always present on human skin, or sweat secreted by the human body.

[0003]

Problems to be solved by the invention

Because consumer preference is widely varied, a variety of products is desired. Especially, in the food and beverage or the fragrance and cosmetics field, development of a variety of foods and beverages or of fragrances and cosmetics corresponding to the preference of consumers is in demand. Because [present] fragrances which are raw materials and are made from fragrance compounds for which patent applications have been submitted, have

not effectively met the demand, development of either a fragrance compound having long-lasting fragrance and flavor superior to conventional fragrance compounds, or a precursor of such a compound, is an urgent problem.

[0004]

In order to solve the above-mentioned problems, research on glycosides of fragrance compounds was undertaken by the inventors. It was found that substituted glucosamine derivatives of the above-mentioned formula (1) not described in the literature have neither the fragrance nor flavor of a fragrance compound, but when the derivative is brought in contact with water, enzymes present in the plant body, bacteria always present on human skin or sweat secreted by the human body, imino bonds of the derivative are cut and an aldehyde (a fragrance compound) gradually evaporates, so that it can be effective as a long-lasting fragrance composition having a long-lasting fragrance or flavor, and is able to solve the above-mentioned problem. Thus, the present invention was completed.

[0005]

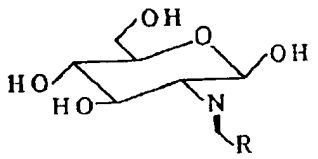
Therefore, the purpose of the present invention is to provide substituted glucosamine derivatives of the above-mentioned formula (1) not described in the literature, and to provide a long-lasting fragrance composition containing the compound of the above-mentioned formula (1) as an active ingredient.

[0006]

Means to solve the problems

The present invention provides a long-lasting fragrance composition containing a substituted glucosamine derivative of the following formula (1):

[Structure 4]



(1)

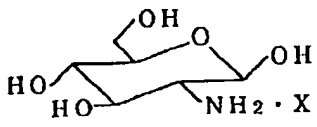
(in the formula, R is the same as above) and a long-lasting fragrance composition characterized by containing the derivative as an active ingredient.

[0007]

Application mode of the invention

A compound of formula (1) used in the present invention can be easily made by carrying out reaction of glucosamine chloride of the following formula (2):

[Structure 5]



(2)

(in formula, X represents an inorganic strong acid such as hydrochloric acid or sulfuric acid) with an aldehyde of the following formula (3):

$$R-CHO \qquad (3)$$

(in the formula, R is the same as above) in a polar organic solvent in the presence of a basic group. In the following, the details of a synthesis method for compounds of formula (1) of the present invention are explained.

[0008]

Glucosamine is known as a component of chitin, which is the polychaccharide of the outer skeleton of shellfish such as crab or shrimp. It is known that glucosamine chloride, a raw material for synthesis of compounds of formula (1), can be easily made by treating [glucosamine] with an inorganic strong acid such as

hydrochloride or sulfuric acid [sic]. Glucosamine chloride can be easily obtained commercially at a low price. Examples of compounds of formula (2) which can be obtained by the above-mentioned process include glucosamine chloride and glucosamine sulfate.

[0009]

Aldehydes of formula (3), another raw material used in the present invention, are fragrance compounds used as a fragrance material, and are easily obtained commercially at a low price. Examples of compounds of formula (3) include aliphatic aldehydes such as acetaldehyde, isopropyl aldehyde, propyl aldehyde, isobutyraldehyde, butyraldehyde, amyl aldehyde, isoamyl aldehyde, octanal, 3-methyl-1-pentanal, 2-hexanal, 2-heptanal, 3,5,5-trimethylhexanal, undecyl aldehyde, cis-3-hexenal, 6-nonen-1-al, trans-4-decenal, 2,6-nonadien-1-al, homocitronellal, neral, citral, lavandulal, farnesol, hydroxycitronellal, or methylthioacrolein; alicyclic aldehydes such as perilaldehyde, 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde, 4-(4-methyl-3-penten-1-yl)-3-cyclohexene-1-carboxaldehyde, 3,5-dimethyl-3-cyclohexene-1-carboxaldehyde, perilaldehyde [sic], or furfural; aromatic aldehydes such as benzaldehyde, cumaldehyde, phenyl acetaldehyde, phenylpropyl aldehyde, cinnamaldehyde, α-amyl cinnamaldehyde, anisaldehyde, vanillin, piperonal, helional, cyclamen aldehyde, lilial, salicyl aldehyde, or hexyl cinnamaldehyde.

[0010]

The reaction is carried out at -78°C to 150°C, especially 0-50°C, for 1-50 h. The amount of aldehyde used for the reaction is suitably 0.5-50 mol, especially 1-5 mol, per 1 mol of glucosamine chloride.

[0011]

Examples of basic groups include sodium hydroxide; potassium hydroxide, sodium methylate, sodium ethylate, sodium ethylate, and potassium carbonate. The amount used is suitably 0.5-2 mol for 1 mol of compound of formula (2). Examples of polar organic solvent used for the reaction include methyl alcohol, ethyl alcohol, ethylene glycol, chloroform, N,N-dimethylformaldehyde, and acetonitrile. The amount of organic solvent used is suitably 1-200 parts by weight for 1 part by weight of compound of formula (2). After the reaction is completed, a substituted glucosamine derivative of the above-mentioned formula (1) can be obtained in both good yield and good purity by conventional separation means including washing, extraction, recrystallization, and drying.

[0012]

Examples of compound (1) which can be made in the above-mentioned process include glucosamine derivatives substituted with a residue of the above-mentioned aldehydes. Examples of especially suitable derivatives include the following. The melting point of each derivative is also shown in the following.

[0013]

① 置換グルコサミン誘導体［（1）化合物］	融点（℃）②
③ シス-3-ヘキセニリデン-D-グルコサミン	107■110℃（分解）
⑤ オクチリデン-D-グルコサミン	100■103℃（分解）
⑥ シトロネリリデン-D-グルコサミン	101■104℃（分解）
⑦ ベンジリデン-D-グルコサミン	104■110℃（分解）
⑧ 2-フェニルエチリデン-D-グルコサミン	105■107℃（分解）
⑨ シンナミリデン-D-グルコサミン	130■135℃（分解）
⑩ シトリリデン-D-グルコサミン	114■115℃（分解）
⑪ α-アミルシンナミリデン D-グルコサミン	126■128℃（分解）
⑫ 2-メチル-3-(4-tert-ブチルフェニル)プロピリデン-D-グルコサミン	111■113℃（分解）
⑬ 2,4-又は3,5-ジメチル-3-シクロヘキセニルメチリデン-D-グルコサミン	105■108℃（分解）
⑭ 7-ヒドロキシシトロネリデン-D-グルコサミン	104■106℃（分解）
⑮ トランス-2-ヘキセニリデン-D-グルコサミン	108■113℃（分解）
⑯ α-ピペロニルプロピリデン-D-グルコサミン	105■110℃（分解）
⑰ 4-イソプロペニル-1-シクロヘキセニルメチリデン-D-グルコサミン	117■120℃（分解）
⑱ 4-ヒドロキシ-3-メトキシフェニルメチリデン-D-グルコサミン	118■123℃（分解）
⑲ 3-メチルチオプロピリデン-D-グルコサミン	90■95℃（分解）

④

Key: 1 Substituted glucosamine derivative (compound (1))
2 Melting point (+C)
3 cis-3-Hexenylidene-D-glucosamine
4 (decomposition)
5 Octylidene-D-glucosamine
6 Citronellylidene-D-glucosamine
7 Bbenzylidene-D-glucosamine
8 2-Phenylethylidene-D-glucosamine
9 Cinnamylidene-D-glucosamine
10 Citrylidene-D-glucosamine
11 α-Amylcinnamylidene-D-glucosamine
12 2-methyl-3-(4-t-butylphenyl)propylidene-D-glucosamine
13 2,4- or 3,5-Dimethyl-3-cyclohexanylmethylidene-D-glucosamine
14 7-Hydroxycitronellidene-D-glucosamine
15 trans-2-Hexenylidene-D-glucosamine
16 α-Piperonylpropylidene-D-glucosamine
17 4-Isopropenyl-1-cyclohexenylmethylidene-D-glucosamine
18 4-Hydroxy-3-methoxyphenylmethylidene-D-glucosamine
19 3-Methylthiopropylidene-D-glucosamine

[0014]

Glucosamine derivatives of fragrance compounds of the above-mentioned new formula (1) have neither fragrance or flavor, but the derivative is gradually decomposed when the derivative is brought in contact with water, enzymes present in the plant body, bacteria always present on human skin, or sweat secreted by the human body, followed by evaporation of the aldehyde (fragrance compound). Therefore, because a fragrance composition containing a compound of formula (1) has good duration of fragrance and flavor, it is suitable as a fragrance material for long-lasting fragrance compositions. Because aldehydes of formula (3) generated by decomposition of compounds of formula (1) have

so-called aldehyde-like fragrances and flavor, they are always contained in aldehyde-like fragrance compositions. The amount of compound of formula (1) used for a fragrance composition depends on the purpose or the type of fragrance composition. However, it is suitably 0.001-30 wt% of the entire amount of the fragrance composition.

[0015]

A composition having fragrance and flavor and containing a compound of the above-mentioned formula (1) as an active ingredient can be made by the present invention. The composition can be used to provide foods and beverages characterized by containing a compound of formula (1) as a precursor of a fragrance and flavor component, fragrance and cosmetics characterized by containing a compound of formula (1) as a precursor of a fragrance and flavor component, and health products, sanitary products, or medications characterized by containing a compound of formula (1) as a precursor of a fragrance and flavor component.

[0016]

The following foods and beverages containing suitable amounts of compounds of formula (1) having long-lasting fragrance or flavor can be provided: beverages such as fruit juice, wine, dairy drink, or soda; frozen deserts such as ice cream, sorbet, or ice milk; favorite foods or drinks such as Japanese sweets, cake, jam, chewing gum, bread, coffee, cocoa, tea, or green tea; soups such as Japanese soup or regular soup; flavorings or

seasonings; a variety of instant foods or drinks; and a variety of snacks. The following cosmetics containing suitable amounts of compounds of formula (1) having long-lasting fragrance can be provided: base agent for hair cosmetics such as shampoo, hair cream, pomade, or other hair cosmetics; base agent for cosmetics such as facial powder, lipstick, other cosmetics, or other cosmetic soaps. Health products, sanitary products, or medications including health or sanitary products such as laundry detergent, detergent for disinfection, room deodorant, or others; flavorings or fragrance, can be also provided.

[0017]

In the following, the details of the present invention are explained with application examples.

Application examples

Application Example 1

Synthesis of citrylidene-D-glucosamine (compound of Formula (1))

Both methanol (100 mL) and 85% potassium hydroxide (3.3 g, 0.05 mol) were introduced and stirred in a triangular flask (200 mL). After the potassium hydroxide dissolved, both glucosamine hydrochloride (10.78 g, 0.05 mol) and mirabilite (7.1 g, 0.05 mol) were added. Then, citral (15.2 g, 0.10 mol) was added dropwise over 10 min to carry out the reaction. After the dropwise addition was completed, reaction was carried out with stirring at standard temperature over night, followed by

filtration. The filtered solution was condensed, then ether was added to wash the condensed solution. Citrylidene-D-glucosamine crystals (14.4 g) were made.

Melting point: 114-115°C (decomposition)
Yield: 92.1%

[0018]

Application Examples 2-8

Synthesis of each substituted glucosamine derivative (compound of formula (1))

Each substituted glucosamine derivative was synthesized by the same production method used in Application Example 1. The results are shown in Table I.

[0019]

Table I

No	①式(3)化合物	①式(2)化合物	①式(1)化合物	②収率(%)
2	③シトロネラール	グルコサミン塩酸塩	シトロネリリデン-D-グルコサミン	43.6%
3	④ベンズアルデヒド	グルコサミン塩酸塩	ベンジリデン-D-グルコサミン	33.3%
4	⑤シンナミックアルデヒド	グルコサミン硫酸塩	シンナミリデン-D-グルコサミン	24.2%
5	⑥シス-3-ヘキセナール	グルコサミン塩酸塩	シス-3-ヘキセニリデン-D-グルコサミン	20.1%
6	⑦オクタナール	グルコサミン硫酸塩	オクチリデン-D-グルコサミン	45.2%
7	⑧フェニルアセトアルデヒド	グルコサミン塩酸塩	2-フェニルエチリデン-D-グルコサミン	39.6%
8	⑨リグストラール	グルコサミン硫酸塩	2,4-又は3,5-ジメチル-3-シクロヘキセニルメチリデン-D-グルコサミン	35.5%

Key: 1 Compound of formula
2 Yield (%)
3 Citronellal
glucosamine hydrochloride
citronelylidene-D-glucosamine
4 Benzaldehyde
glucosamine hydrochloride
benzilidene-D-glucosamine
5 Cinnamaldehyde
glucosamine hydrochloride
cinnamilidene-D-glucosamine
6 cis-3-Hexenal
glucosamine hydrochloride
cis-3-hexenylidene-D-glucosamine
7 Octanal
glucosamine hydrochloride
octylidene-D-glucosamine
8 Phenylacetaldehyde
glucosamine hydrochloride
2-phenylethylidene-D-glucosamine
9 Ligustral
glucosamine hydrochloride
2,4- Or 3,5-Dimethyl-3-cyclohexenylmethylidene-D-glucosamine

The chemical name for ligustral is 2,4- or 3,5-dimethyl-3-cyclohexenylaldehyde.

[0020]

Application Example 9 and Comparative Example 1

Citral 1% ethanol solution (comparative product 1) and citrilidene-D-glucosamine 1% ethanol solution (product of the present invention 1) synthesized in Application Example 1 were

separately made. Comparative product a (about 0.5 mL) was applied to the left upper arm of a panel member, and the product of the present invention 1 (about or 5 mL) was applied to the right upper arm of the same panel member. Variation in fragrance maintenance on each panel member was compared by follow-up observation. The results are shown in Table II. The following evaluation symbols were used:

-: no generation of citral fragrance was observed
±: slight generation of citral fragrance was observed
+: generation of citral fragrance was observed
++: significant generation of citral fragrance was observed
+++: excessive generation of citral fragrance was observed.

[0021]

Table II

①経過時間	②滴下時	③6時間後	③12時間後	④1日後	④2日後
⑤比較品1	+++	+	±	−	−
⑥本発明品1	±	++	+++	+++	++

Key: 1 Time
2 During dropwise application
3 After [blank] hours
4 After [blank] days
5 Comparative product 1
6 Product 1 of the present invention

[0022]

As seen in the results shown in Table II, in the case of citrylidene-D-glucosamine, product of the present invention 1, immediately after application to the upper arm, slight but increasing generation of citral fragrance was observed. Because a strong citral fragrance was still maintained after 2 days, it was verified that it was effective for maintaining fragrance. On the other hand, in the case of comparative product 1, immediately after application to the upper arm, excessive but quickly reduced generation of citral fragrance was observed. After 12 h, slight generation of citral fragrance was observed, and after 1 day, no generation of citral fragrance was observed, so that it had extremely poor fragrance maintenance. The reason a good fragrance could be maintained was assumed to be because the glucosamine was gradually decomposed by bacteria always present on human skin, or water contained either in the human body or in the air when citrylidene-D-glucosamine was applied to the upper arm, after which citral was generated.

[0023]

Effect of the invention

The present invention provides glucosamine derivatives substituted with a fragrance compound of the above-mentioned formula (1) not described in the literature. The compounds of formula (1) are suitable as long-lasting fragrance compositions that generate fragrance compounds when brought in contact with water contained in the air, sweat secreted by the human body,

enzymes present in the plant body, or bacteria always present on human skin.